

## Counting Techniques: Permutations

Name \_\_\_\_\_

1.) You have three homework assignments tonight from Math, Science, and English. But, because you are procrastinating you decide to practice your statistics by figuring out the answers to the following questions:

a.) Suppose you need to pick the order in which you complete your assignments. In how many ways can this happen?

b.) You only have time to do two assignments tonight, and one will have to be done during free period tomorrow. How many possible arrangements of two subjects are there? Can you list them all?

2.) A band director has four students who play the French Horn:

a.) How many ways can these students be arranged in the French horn section of the band?

b.) She wants to have a French Horn duet at the spring band concert. If all four of the students are at about the same level of competence, she might as well assign the two pairs (primo and secondo) to two of them randomly. In how many different arrangements can she do this?

3.) There is too much food available at your thanksgiving dinner to be able to put a little of every choice on your plate. There are four salads, six side dishes, two main dishes, and three desserts. How many different arrangements of salad, side dishes, main dishes, and desserts are possible if you choose one of each?

4.) In how many ways can the genders of children be arranged in a family with eight children?

5.) The owner of a small business has decided to allow the middle managers (Jane, Tom, and Pin) to each have one week of vacation during the month of July. Only one manager is allowed on vacation at a time. Assuming that July has four weeks, in how many distinct ways can the managers sign up for vacations?

6.) Suppose each student in a school is assigned one locker. How many ways can three new students be assigned to five available lockers?

7.) An eight-volume set of reference books is kept on a shelf. The books are used frequently and put back in random order.

a.) How many ways can the eight books be arranged on the shelf?

b.) How many ways can the books be arranged so that Volume 5 will be the rightmost book?

c.) What is the probability that Volume 5 will be the rightmost book if the books are arranged at random?

d.) How many ways can the books be arranged so that they are in the correct order, with volume numbers increasing from left to right?

e.) What is the probability that the books happen to be in the correct order?

8.) How many distinct arrangements can be formed using the letters in *unsuccessful*?

9.) How many distinct arrangements can be formed using the letters in *Tallahassee*?

10.) Assume that 26 books, consisting of 8 identical mathematics texts, 6 identical computer science texts, 9 identical physics books, and 3 identical chemistry texts are to be placed on a shelf. How many distinct ways can they be placed on the shelf?

11.) An urn contains 6 blue balls, 5 red balls, and 14 yellow balls. If all of the balls of each color are indistinguishable, how many distinct ways can all of the balls be drawn, one at a time, from the urn?

12.) A baseball team has 24 players. They are staying in six hotel rooms with four players in each room. How many different ways can the players be assigned to the rooms?